




DRB120 Series Instruction Manual

BEFORE USING THE POWER SUPPLY UNIT

Pay attention to all warnings and cautions before using the unit. Incorrect usage could lead to an electrical shock, damage to the unit or a fire hazard.

- **Warning Symbols**

CAUTION	
• DO NOT MODIFY OR DISASSEMBLE THE POWER SUPPLY.	
• READ INSTRUCTION MANUAL BEFORE CONNECTING TO MAINS.	
• ELECTRIC SHOCK HAZARDOUS ON THE CONNECTOR SECTION.	

NOTICE:

(1) Installing/Storage Environment

1. Store the product with ambient temperature -40 to $+85$ °C, and relative humidity 5 to 95% (No dewdrop).
2. Operation under the following conditions can reduce product life:
 - (a) Over current
 - (b) Output terminals shorted
 - (c) Out of input voltage range
 - (d) Out of operating temperature range
 - (e) Out of PSU specification
3. Confirm connections to input/output terminals are correct as indicated in the instruction manual.
4. Use the product where the relative humidity is 5 to 95% (No dewdrop).
5. Avoid places where the product is subjected to direct sun light.
6. Avoid places where the product is subjected to penetration of liquid, foreign substance or corrosive gas.
7. Avoid places subject to shock or vibration.
A device such as a contact breaker may be a vibration source. Set the power supply as far as possible from possible sources of shock or vibration.
8. If the power supply is used in an area with excessive electronic noise, be sure to separate the Power Supply as far as possible from the noise sources.
9. Don't use the product in the environment with strong electromagnetic field, corrosive gas and conductive substance.
10. Model/type reference: DRB120-24-1-xyz (where xyz is optional and can be alphanumeric characters or blank and it is not a safety related information - product ratings unchanged)

Precautions in Using the product:

When the product is used under the circumstance or environment below, ensure adherence to limitations of the ratings and functions.

Also take countermeasures for safety precautions such as fail-safe installations.

1. Under the circumstances or environment which are not described in the instruction manual.
2. For nuclear power control, railway, aircraft, vehicle, incinerator, medical equipment, entertainment equipment, safety device etc...
3. For applications where death or serious property damage is possible and extensive safety precautions are required.
4. Not to be used with a high inductive power source, as it may cause unstable operation of the power supply.

Note: CE MARKING

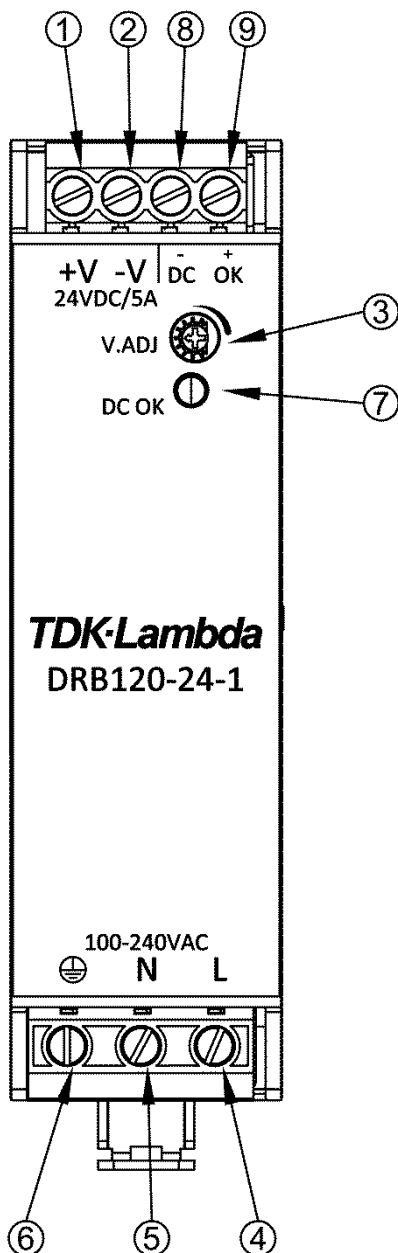
CE Marking, when applied to a product covered by this handbook indicates compliance with the following:
 Low Voltage Directive in that it complies with EN60950-1.

EMC Directive

Restriction of the use of certain Hazardous Substances Directive

2. Terminal Explanation

2-1. DRB120



- ① +V: +Output terminal
- ② - V: - Output terminal
- ③ V.ADJ: Output voltage adjust trimmer
The output voltage rises when trimmer is turned clockwise.
- ④ L: AC Input terminal
Live line (fuse in line)
- ⑤ N: AC Input terminal
Neutral line
- ⑥ \oplus : Protective Earth
Connect to safety ground of apparatus or equipment.
- ⑦ DC OK : Green LED lights when Output voltage is turn on and within specification
- ⑧ - DC : Optocoupler
- ⑨ + OK : Optocoupler

WIRING

CONNECTOR	Recommended Wire	Rated Torque
INPUT (L, N, \oplus)	10~24 AWG	10.3 kgf.cm (9 lbf.in)
OUTPUT (+V, -V)	10~24 AWG	10.3 kgf.cm (9 lbf.in)
OUTPUT (DC OK)	10~24 AWG	10.3 kgf.cm (9 lbf.in)

Note: According to EN/UL60950-1 multi-strand flexible cables connected to the input require ferrule.

3. Terminal Connecting Method

Pay attention to the input wiring. If it is connected to wrong terminal, the power supply will be damaged.

- Input must be off when making connections.
- Connect \oplus (Protective Earth) terminal of input connector to ground terminal of the equipment.
- The output load line and input line shall be separated and twisted to reduce noise sensitivity.

When connecting or removing input and output wire, do not apply stress to PCB.

4. Explanation of Functions and Precautions

4-1. Input Voltage Range

Input voltage range is single phase 85 ~ 264VAC (47~63Hz) can withstand 300VAC surge for 5 seconds during operation. Input voltage which is out of specification may cause unit damage. For cases where conformance to various safety specs (UL, CSA, EN) are required, input voltage range will be 100 ~ 240VAC (50/60Hz).

4-2. Output Voltage Range

Output voltage is set to the rated value at shipment. V.ADJ trimmer on the front panel side can be used to adjust the output voltage within the range specified (refer to specifications for adjustable range).

To turn the trimmer clockwise, the output voltage will be increased. Take note when the output voltage is increased excessively, over voltage protection (OVP) function may trigger and the output voltage will shut down. Furthermore, when increasing the output voltage, reduce the output current so as not to exceed the maximum output power.

4-3. Over Voltage Protection (OVP)

The OVP function will shut down the output. To reset the OVP, disconnect the input voltage from the power supply for a minute and then re-apply. Possible to hiccup if the unit prior to OVP point is already overloaded. The OVP point is fixed and cannot be adjusted externally.

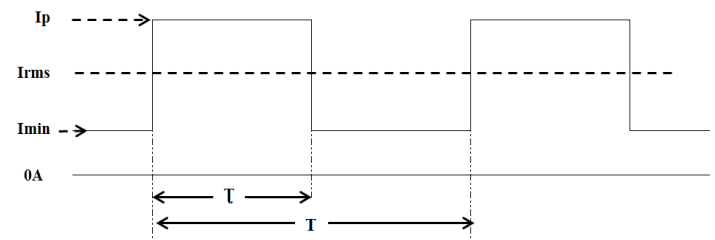
4-4. Over Current Protection (OCP)

Hiccup mode with automatic recovery. If the output current is >101% of peak load, the unit will hiccup. Avoid continuous operation in overload or short condition may result in damage to the power supply.

4-5. Peak output current

The DRB120 can deliver 120% peak current for 10 seconds aiding the startup of capacitive loads and operation of downstream circuit breakers. The operating conditions for peak output current are as followed:

- Duty cycle of peak current, $D \leq 35\%$
- \leq rated output power and RMS current
- Reduce peak current according to output derating curve for higher ambient temperature.
- Peak output current and its duration are defined as followed:



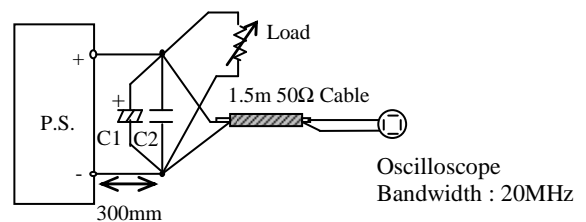
I_p : Peak output current (A)
 I_{rms} : Rms output current (Arms)
 I_{min} : Minimum output current (A)
 τ : Peak current pulse width (sec)
 T : Period (sec)

Input voltage range (V_{in})	: 85 - 264VAC
Continuous peak output time (τ)	: Within 10 sec
Peak output current (I_p)	: Within the rated peak output current (6A)
Rms output current (I_{rms})	: Within the rated rms output current (5Arms)

Duty, $D = \tau / T \times 100\%$	$\leq 35\%$
$I_{rms} = [I_p^2 \times D + I_{min}^2 \times (1-D)]^{1/2}$	$\leq 5Arms$

4-6. Output Ripple & Noise

The standard specification for maximum ripple value is measured according to measurement circuit as below. When load lines are longer, ripple becomes larger. In this case, electrolytic capacitor, film capacitor, etc. might be necessary to use across the load terminal. The output ripple cannot be measured accurately if the probe ground lead of oscilloscope is too long.

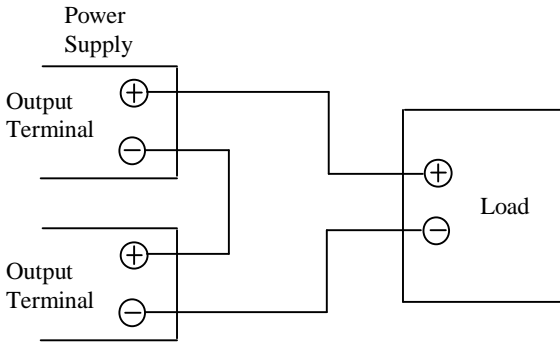


C1 : 47μF Electrolytic Capacitor
 C2 : 0.1μF Film Capacitor

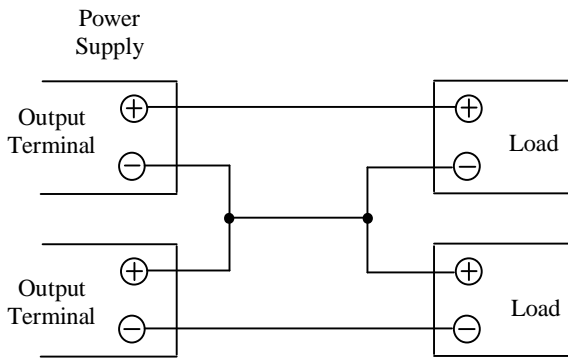
4-7. Series Operation

For series operation, either method (A) or (B) is possible.

Method (A)



Method (B)



4-9. Withstand Voltage

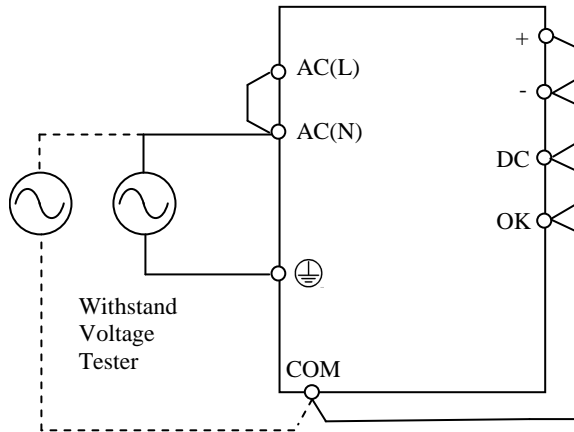
This series is designed to withstand 4243VDC between input and output, 2500VDC between input and \oplus (Protective Earth) and 707VDC between output and the \oplus (Protective Earth) each for 1 minute. When testing withstand voltage, set current limit of the withstand voltage test equipment to 20mA (Output - \oplus (Protective Earth) : 100mA). The applied voltage must be gradually increased from zero to the testing value and then gradually decreased for shut down. When timer is used, the power supply may be damaged by high impulse voltage at timer switch on and off. Connect input and output as follows.

Input ~ Output (dotted line)

4243VDC 1min. (20mA)

Input ~ \oplus (Protective Earth) (solid line)

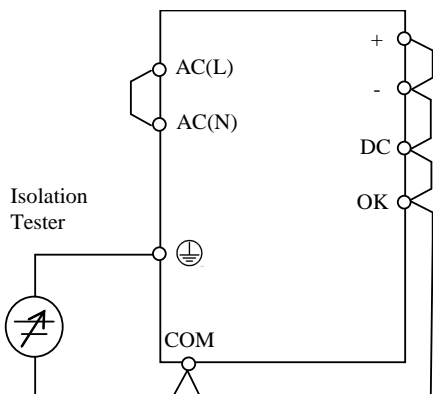
2500VDC 1min. (20mA)



4-8. Isolation Test

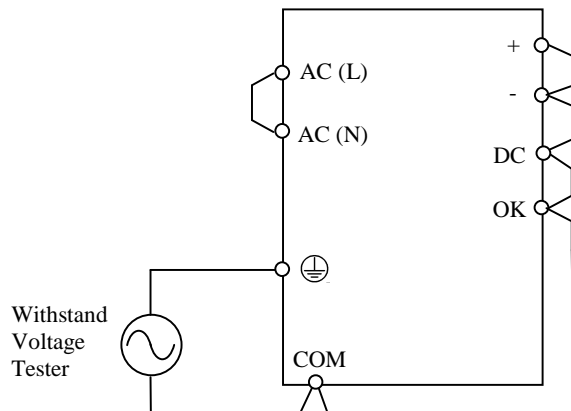
Isolation resistance between output and \oplus (Protective Earth) shall be more than 100MΩ at 500VDC. For safety operation, voltage setting of DC isolation tester must be done before the test. Ensure that the unit is fully discharged after the test.

Output ~ \oplus (Protective Earth) : 500VDC 100MΩ or more



Output ~ \oplus (Protective Earth)

707VDC 1min. (100mA)



4-10. Output Dynamic Load Response

During output dynamic load test (0%-100% load), the output voltage level might experience a higher voltage dip of -8% (typ).

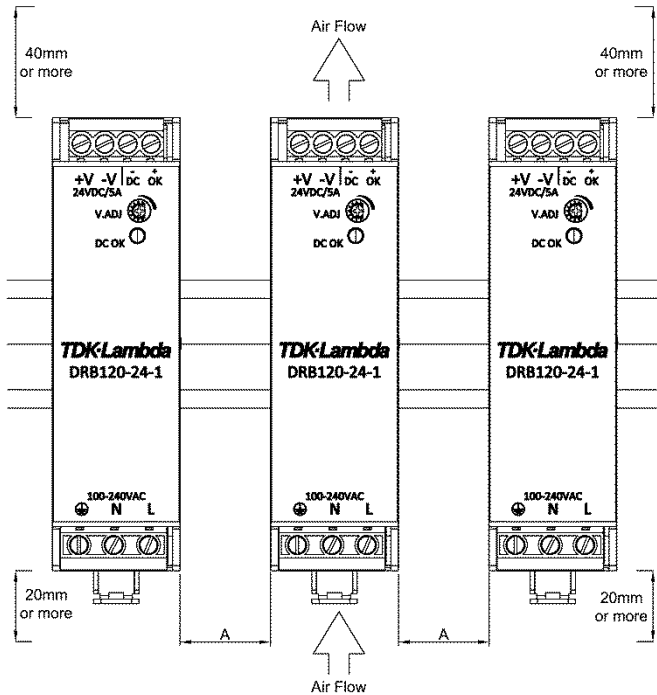
For example, VIN = 230VAC Dynamic Load = 0% - 100% Ta = 25degC, the output voltage level dip will be -8% (typ).

5. DC OK

In normal operation the DC OK (optocoupler) is closed when the output voltage is greater than 80% of nominal output voltage. When the output is less than 80% of nominal output voltage the optocoupler is open.

6. Mounting Directions

Recommended standard mounting method is vertical with the output connector uppermost. Do not exceed the load deratings. See section 9. Leave enough space surround the units to ventilate heat efficiently.

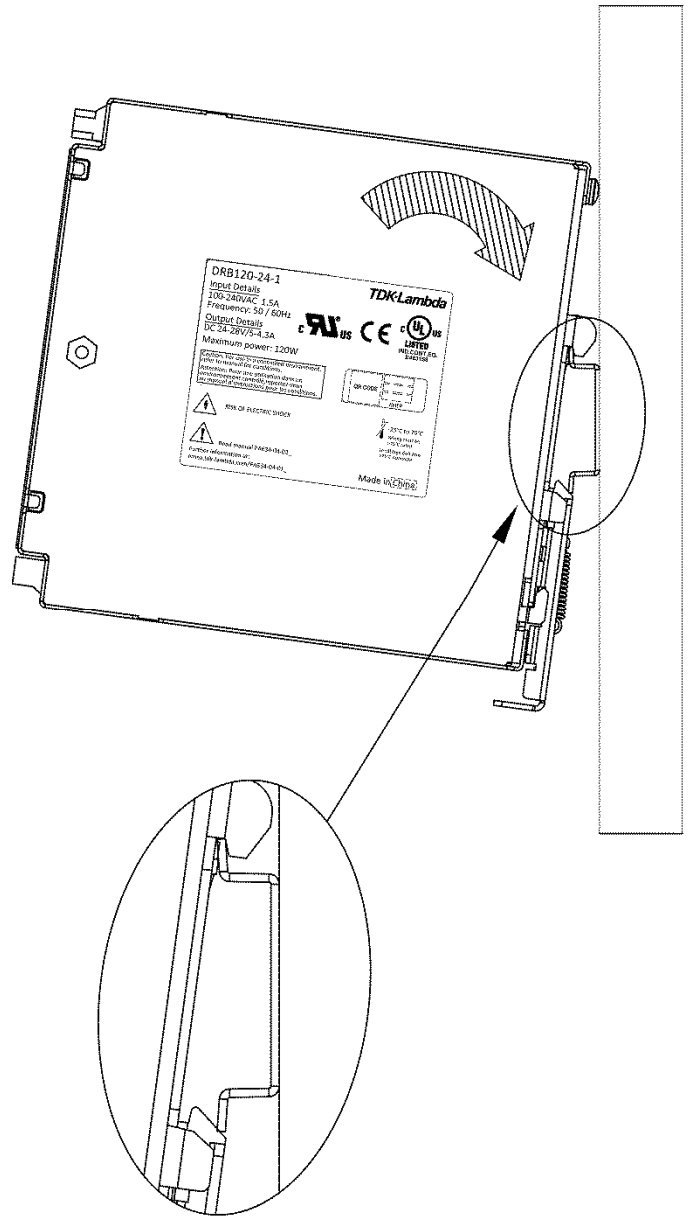


Minimum Installation clearances:
 40mm on top, 20mm on the bottom, A=5mm which is recommended on the left and right side when products are permanently loaded with full 120W. In case the adjacent device is a heat source, A=15mm clearance is recommended

6.1. Power supply mounting on DIN RAIL (TS35 or equivalent)

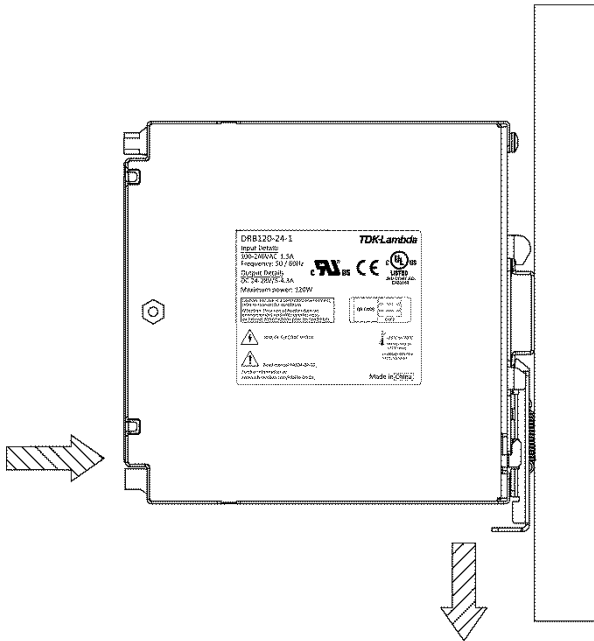
Make sure input and output wire disconnected when mount power supply onto rail

- (1) Tilt the unit slightly rearwards, fit the unit over top hat rail.



- (2) Slide it downward until it hits the stop.

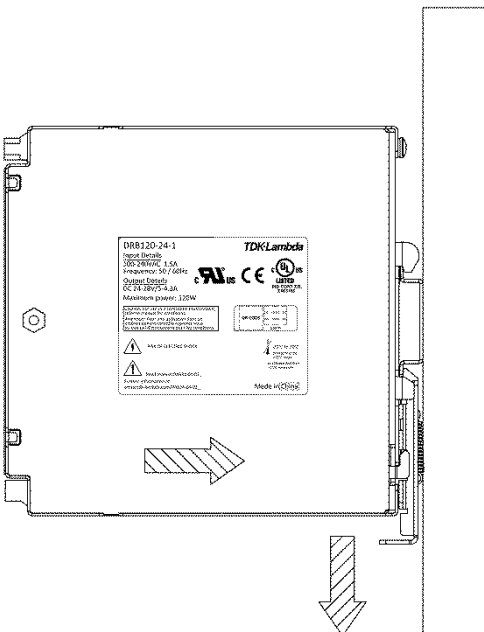
- (3) Press against the bottom front side for locking.
 Shake the unit slightly to check the locking action.



- (4) In order to tighten the unit mounting, the Din rail stopper attached on both sides of the unit is recommended.

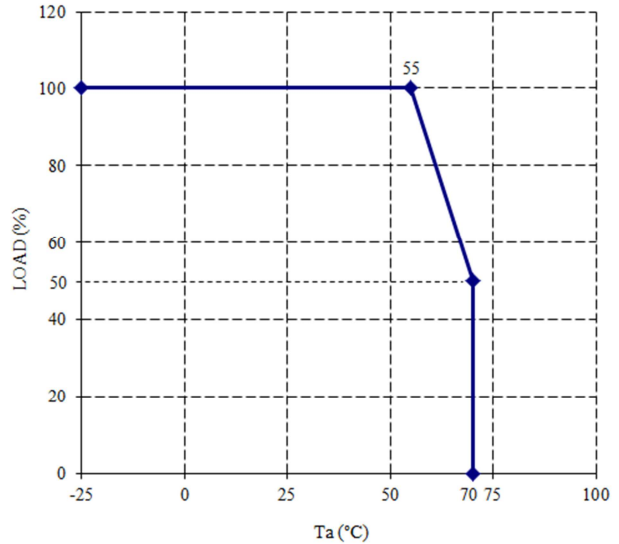
6.2. Power supply removal from DIN RAIL

- (1) Switch main power off and disconnect your system from the supply network. Pull the latch on the rear lower edge of the unit downwards and gently lift lower front edge of the unit (tipping upwards) and remove it.



7. Output Derating – DRB120 series

OUTPUT DERATING CURVE



8. Wiring Method

The output load line and input line shall be separated and twisted to improve noise sensitivity. Use all lines as thick and short as possible to make lower impedance. Noise can be eliminated by attaching a capacitor to the load terminals. EMI reduction performance by winding the cable around a toroidal ferrite core several times. Use any appropriate commercially available ferrite core from local vendor. For safety and EMI considerations, connect ⊕ (Protective Earth) terminal of input connector to ground terminal of equipment.

8.1 EMC

The DRB120 complies with the provisions of the EMC directive and meets the following standards:
 Emissions: EN55011/EN55032 Class B, EN61204-3 Class A
 Immunity: EN61000-4-2, -3, -4, -5, -6, -8, -11

9. External Fuse Rating

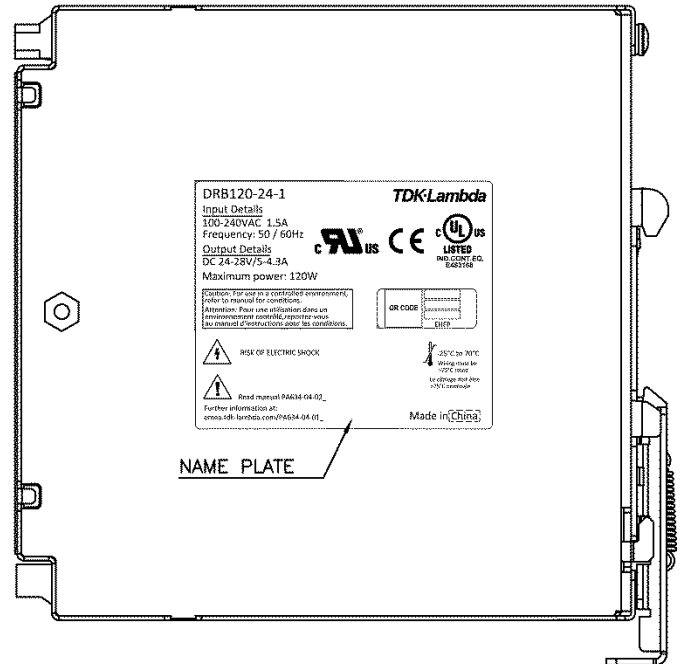
If required a 250Vac/3.15A rated fuse rating should be fitted external on input line. Surge current flows when line turns on. Use slow-blow fuse or time-lag type fuse. Do not use fast-blow fuse. Fuse rating is specified by in-rush current value at line turn-on. Do not select the fuse according to input current (RMS.) values under the actual load condition.

10. DRB240 series UL508 Listed Condition

WIRING

CONNECTOR	Recommended Wire	Rated Torque
INPUT (L, N, \oplus)	10~24 AWG	10.3 kgf.cm (9 lbf.in)
OUTPUT (+V, -V)	10~24 AWG	10.3 kgf.cm (9 lbf.in)
OUTPUT (DC OK)	10~24 AWG	10.3 kgf.cm (9 lbf.in)

- 1) Wire requirements, use minimum 75°C wire, use copper conductor only
- 2) For use in a Pollution degree 2 environment only
- 3) These products are considered for use where maximum surrounding air temperature does not exceed 70°C. When installing these products please refer to section 9 for derating.
- 4) Indoor use only



Product marking:

TDK-Lambda

TDK-Lambda Singapore Pte. Ltd.
(Sales, Services and R&D)
1008 Toa Payoh North #06-01/08, #07-01/03
Singapore 318996
Telephone: +65 62517211
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WEBSITE: www.tdk-lambda.com.sg

Note : Model name, input voltage range, nominal input voltage, maximum output current, country of manufacture, additional approval markings and CE mark are shown in accordance with the product specification.

11. Before concluding that the unit is at fault...

Before concluding that the unit is at fault, make the following checks.

- Check if the rated input voltage is connected.
- Check if the wiring of input and output is correct.
- Check if the wire material is not too thin.
- Check if the output voltage control (V.ADJ) is properly adjusted.
- Check if the output current and output wattage do not over specification.
- Audible noise can be heard during dynamic-load operation.
- Audible noise can be heard when input voltage waveform is not sinusoidal wave.
- Audible noise can be heard during no/light load where the unit is in bursts mode condition.

12. Returns

Please contact your local sales office or visit our website to arrange return of any faulty product.